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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,128	10/26/2001	Manjunath Narayanaswamy	ADAPP206	2461

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EXAMINER	
VITAL, PIERRE M	

ART UNIT	PAPER NUMBER
2188	3

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PPE

Office Action Summary	Application No.	Applicant(s)	
	10/045,128	NARAYANASWAMY ET AL.	
	Examiner	Art Unit	
	Pierre M. Vital	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. This Office Action is in response to Application No. 10/045,128 filed October 26, 2001. Claims 1-20 are pending in this application.

2. The specification and the claims have been examined with the results that follow.

Specification

3. The disclosure is objected to because of the following informalities:

(a) On page 8, line 4, it appears that after "block diagram", "100" should be changed to –120--.

(b) On page 8, line 12, it appears that "diver" should be replaced with –driver--.

Appropriate correction is required.

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

5. Claim 5 is objected to because of the following informalities:

In claim 5, line 2, after "transparent", it appears that "o" should be replaced with –to--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 4, 7, 8 and 10-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeffries (US5,974,544).

As per claim 1, Jeffries discloses a method for merging contiguous like commands for transfers between a storage medium and memory, comprising: accumulating a plurality of commands in a queue while a first command is being processed by the storage medium [*pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28]; examining the plurality of commands in the queue while the first command is being processed , the examining further including, checking if any of the plurality of commands are like commands [*related sequences of atomic operations are kept together*; col. 5, lines 7-13], each of the like commands corresponding to a file stored on a storage medium; and determining if any of the files on the storage medium are stored contiguously with respect to one another [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59]; combining the like commands corresponding to contiguous files as a combined command [*reads to contiguous disk blocks are combined into one disk read*; col. 29, lines 49-50]; and issuing the

combined command to the storage medium upon completion of the processing of the first command [*a request must complete prior to starting the next*; col. 12, lines 26-28].

As per claim 2, Jeffries discloses the storage medium is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

As per claim 4, Jeffries further discloses providing a multithread environment, the multithread environment allowing multiple read and write commands to be processed concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 7, Jeffries discloses a method for combining commands for data transfer between a drive and memory, comprising: receiving multiple read or write commands in a queue [*pending requests are maintained in a queue*; col. 12, line 24]; processing a first command of the multiple read or write commands [*requests are handled serially and a request must complete prior to starting the next*; col. 12, lines 24-28]; examining the multiple read or write commands, the examining including, identifying like commands of the multiple read or write commands while processing the first command [*related sequences of atomic operations are kept together*; col. 5, lines 7-13; *pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28]; each of the like commands being associated with a file stored on the drive, and ascertaining which of the files associated with the like commands are contiguous files [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if*

two or more requests involve close proximity sectors; col. 70, lines 52-59]; creating a combined command, the combined command being configured to consolidate the identified like commands being associated with contiguous files [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50]; and issuing the combined command to the drive [*a request must complete prior to starting the next*; col. 12, lines 26-28].

As per claim 8, Jeffries further discloses providing a multithread environment, the multithread environment allowing multiple read and write commands to be processed concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 10, Jeffries discloses the queue has a capacity of 256 commands [*the controller has 256K of RAM*; col. 7, lines 20-21].

As per claim 11, Jeffries further discloses processing the combined command and generating one interrupt for the processed combined command [*upon completion of the transfer, the event completion interrupt is serviced*; col. 22, lines 64-67].

As per claim 12, Jeffries discloses an apparatus for merging contiguous like commands, comprising an operating system, the operating system generating read and write commands [*CPU is operating in a multiprogramming environment and generates read/write requests*; col. 3, lines 14-30]; a storage media, the storage media being configured to process read and write commands [*this allows parallel writes by the disk drives*; col. 3, lines 15-16], the read and write commands being associated with files stored on the storage

media [*read or write requests access to stripes of sectors*; col. 46, lines 50-58]; and a driver queue, the driver queue being configured to receive the read and write commands from the operating system [*request is enqueued on the disk driver's queue or the transfer driver's queue*; col. 21, lines 46-52], the read and write commands being examined in the driver queue to identify like commands associated with contiguous files on the storage media [*reads are enqueued in the disk driver's queue and writes are enqueued in the transfer driver's queue*; col. 21, lines 48-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59], the identified commands being, combined into one command [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50], the one command being issued to the storage media [*a request must complete prior to starting the next*; col. 12, lines 26-28].

As per claim 13, Jeffries discloses the storage media is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

As per claim 14, Jeffries discloses further including: a multithread environment, the multithread environment allowing for multiple combined commands to be processed concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 17, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544).

As per claim 17, Jeffries discloses combining commands for data transfer between a drive and memory, comprising: receiving multiple read or write commands in a queue [*pending requests are maintained in a queue*; col. 12, line 24]; processing a first command of the multiple read or write commands [*requests are handled serially and a request must complete prior to starting the next*; col. 12, lines 24-28]; combining multiple read or write commands [*reads to contiguous disk blocks are combined into one disk read*; col. 29, lines 49-50], the combining including, identifying like commands of the multiple read or write commands while processing the first command [*related sequences of atomic operations are kept together*; col. 5, lines 7-13; *pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28], each of the like commands being associated with a file stored on the drive, ascertaining which of the files associated with the like commands are contiguous files [*if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59]; creating a combined command, the combined command being configured to consolidate the

identified like commands being associated with contiguous files [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50]; issuing the combined command to the drive [*a request must complete prior to starting the next*; col. 12, lines 26-28].

However, Jeffries does not specifically teach a computer readable media having program instructions for performing the steps of claim 17. However, one of ordinary skill in the art would have recognized that a computer readable medium (i.e., floppy, CD-ROM, etc.) carrying program instructions for implementing a method is generally well known in the art, because it would have facilitated the transportation and installation of the method on other systems. For example, a copy of the Microsoft Windows operating system can be found on a CD-ROM from which Windows can be installed onto other systems, which is a lot easier than running a long cable or hand typing the software into another system. The examiner takes Official Notice of this teaching. Therefore, it would have been obvious to one of ordinary skill in the art to put Jeffries' program on a computer readable medium, because it would have facilitated the transporting, installing and implementing of Jeffries' program on other systems.

As per claim 18, Jeffries discloses further including program instructions for providing a multithread environment [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 20, Jeffries discloses the drive is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

10. Claims 3, 6, 9, 15, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544) and Chisholm et al (US5,802,546).

As per claim 3, 9, 15 and 19, Jeffries discloses the claimed invention as detailed above in the previous paragraphs. However, Jeffries does not specifically teach each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being configured to include data pointers as recited in the claims.

Chisholm discloses each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium [*each data control block (DCB) starting address and counts of elements to be processed*; col. 7, lines 45-63], the SGL being configured to include data pointers [*SGL keeps track of scattered data portions*; col. 2, lines 26-31].

It would have been obvious to one of ordinary skill in the art, having the teachings of Jeffries and Chisholm before him at the time the invention was made, to modify the system of Jeffries to include each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being configured to include data pointers because it would have provided a system resulting in a more efficient use of the system memory by providing contiguous data blocks subdivided to fit the non-contiguous memory portions [col. 2, lines 14-21] as taught by Chisholm.

As per claims 6 and 16, the combination of Jeffries and Chisholm discloses the claimed invention as detailed above per claims 3 and 15 in the previous paragraphs.

However, Jeffries does not specifically teach the SGL of a combined command is expanded from the SGL of a non-combined command as recited in the claim.

Chisholm further discloses the SGL of the combined command is expanded from the SGL of a non-combined command [*during a scatter/gather operation on both sides, data gathered on one side equals data scattered on the other side*; col. 5, line 58 – col. 6, line 14].

It would have been obvious to one of ordinary skill in the art, having the teachings of Jeffries and Chisholm before him at the time the invention was made, to modify the system of Jeffries to include SGL of the combined command expanded from the SGL of a non-combined command because it would have improved memory utilization and facilitated data transfer by providing concurrent scatter/gather operation on both sides and by minimizing processing unit intervention in data block transfers [col. 13, lines 26-31] as taught by Chisholm.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544) and Row et al (US5,802,366).

As per claim 5, Jeffries discloses the claimed invention as detailed above in the previous paragraphs. However, Jeffries does not specifically teach the combined command is transparent to the operating system as recited in the claim.

Row discloses the concept of processing command transparent to the operating system [col. 8, lines 28-32].

It would have been obvious to one of ordinary skill in the art, having the teachings of Jeffries and Row before him at the time the invention was made, to modify the system of Jeffries to include a combined command is transparent to the operating system because it would have improved file server performance by eliminating the operating system from virtually all network, file and storage processing as taught by Row.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is required under 37 C.F.R.§1.111 (c) to consider these references fully when responding to this action. The documents cited therein teach combining like commands in a queue for processing to contiguous file, multithreaded processing and scatter/gather operation.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pierre M. Vital whose telephone number is (703) 306-5839. The examiner can normally be reached on Mon-Fri, 8:30 am - 6:00 pm, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703) 306-2903. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-9000.

Pierre M. Vital
Art Unit 2188
October 21, 2003